

1 **SECTION 9-29, ILLUMINATION, SIGNAL, ELECTRICAL**
2 **January 3, 2006**

3 **9-29.2(1) Standard Junction Box**

4 This section including title is revised to read:

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6 **9-29.2(1) Standard Duty and Heavy Duty Junction Box**

7 Concrete junction boxes shall have a minimum compressive strength of 6000 psi when
8 reinforced with a welded wire hoop and 4000 psi when reinforced with welded wire
9 fabric or fiber reinforcement. The frame shall be anchored to the box by welding the
10 wire fabric to the frame or by welding headed studs 3/8 inch x 3 inches long, as
11 specified in section 9-06.15, to the frame. The wire fabric shall be attached to the studs
12 and frame with standard tie practices. The box shall contain ten studs located near the
13 centerline of the frame and box wall. The studs shall be placed one anchor in each
14 corner, one at the middle of each width and two equally spaced on each length of the
15 box. For Standard Duty Junction boxes the steel frame, lid support, and lid shall be
16 painted with a black paint containing rust inhibitors or painted with a shop applied,
17 inorganic zinc primer in accordance with Section 6-07.3 or hot dip galvanized in
18 accordance with ASTM A 111. For Heavy Duty Junction Boxes the steel frame, lid
19 support and lid shall be painted with a shop applied, inorganic zinc primer in
20 accordance with Section 6-07.3

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22 Non-concrete junction boxes shall be gray in color and shall have an open bottom
23 design with approximately the same inside dimensions as concrete junction boxes.
24 Non-concrete junction box lids shall include a pull slot and shall be secured with two ½
25 inch stainless steel hex-head bolts factory coated with anti-seize compound and
26 recessed into the cover. The tapped holes for the securing bolts shall extend
27 completely through the box to prevent accumulation of debris. Bolts shall conform to
28 ASTM F 593, stainless steel.

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30 This section is supplemented with the following new sections:

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32 **9-29.2(1)A Standard Duty Junction Boxes**

33 Standard Duty Junction Boxes are defined as Type 1, 2, 3, 7 and 8 concrete and non-
34 concrete junction boxes and shall have a minimum load rating of 22,500 pounds,
35 applied through a 10 inch. x 10 inch x 1 inch steel plate centered on the lid.

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37 Type 1 non-concrete junction boxes with the same approximate interior dimensions are
38 considered to be equivalent to any Type 1 concrete junction box. The Type 2 and 3
39 non-concrete junction boxes respectively are considered as equivalent to the type 2 and
40 3 concrete junction boxes with the approximate same interior dimensions.

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42 Currently approved Type 1, 2, and 3 junction boxes shall remain approved, unless the
43 design is modified. Any modification to approved junction boxes will require review or
44 retesting for acceptance. The non-concrete junction boxes require testing by an
45 independent testing lab, as described below.

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47 Material for Type 1, 2, 3, 7 and 8 concrete junction boxes shall conform to the following:

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49 Concrete	Section 6-02
50 Reinforcing Steel	Section 9-07

1	Fiber Reinforcing	ASTM C 1116, Type III
2	Lid	ASTM A786 diamond plate steel
3	Frame	ASTM A786 diamond plate steel or
4		ASTM A36 flat steel
5	Lid Support & Handle	ASTM A36 steel
6	Anchors (studs)	Section 9-06.15

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8 **9-29.2(1)B Heavy Duty Junction Boxes**

9 Heavy Duty Junction Boxes are defined as Type 4, 5, and 6 junction boxes and lids
10 shall have a minimum vertical load rating of 46, 000 pounds without permanent
11 deformation and 60,000 pounds without failure.

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13 Material for type 4, 5, and 6 concrete junction boxes shall conform to the following:

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15	Concrete	Section 6-02
16	Reinforcing Steel	Section 9-07
17	Lid	ASTM A786 diamond plate steel, rolled
18		from plate complying with ASTM A572,
19		grade 50 or ASTM A588 with min. CVN
20		toughness of 20 ft-lb at 40 degrees F
21	Frame and stiffener plates	ASTM A572 grade 50 or ASTM A588, both with
22		min. CVN toughness of 20 ft-lb at 40 degrees F
23	Handle	ASTM A36 steel
24	Anchors (studs)	Section 9-06.15
25	Bolts, Nuts, Washers	ASTM F 593 or A 193, type 304 or 316

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27 The lid stiffener plates shall bear on the frame. Mill so that there is full even contact,
28 around the perimeter, between the bearing seat and lid stiffener plates, after fabrication
29 of the frame and lid. The bearing seat and lid perimeter bar shall be free from burrs,
30 dirt and other foreign debris that would prevent solid seating. Bolts and nuts shall be
31 liberally coated with anti-seize compound. Bolts shall be installed snug tight. The
32 bearing seat and lid perimeter bar shall be machined to allow a minimum of 75% of the
33 bearing areas to be seated with a tolerance of 0.0 to 0.005 inches measured with a
34 feeler gage. The bearing area percentage will be measured for each side of the lid as it
35 bears on the frame.

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37 **9-29.2(1)C Testing Requirements**

38 For fabrication approval by the Contracting Agency, junction boxes shall be tested, and
39 a test report from an independent materials testing facility shall be provided showing
40 compliance with the load test.

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42 The test report shall certify that the box and cover meet or exceed the loading
43 requirements and shall document the results of the load test. Three copies of the test
44 report shall be furnished to the Contracting Agency. The report shall include the
45 following information:

- 46
- 47 1. Product identification.
 - 48 2. Date of testing.
 - 49 3. Description of testing apparatus and procedure.
 - 50 4. All load, deflection and failure data.
 - 51 5. Weight of box and cover tested.
 - 52 6. A brief description of type and location of failure.

7. Upon completion of the required test(s) the box shall be loaded to failure.
8. A brief description of type and location of failure.

Prior to installation of junction boxes, the contractor shall provide a certified test report, prepared by an independent testing lab which documents results of testing done by the independent testing lab for the manufacturer. The test report shall certify that the boxes meet or exceed the loading requirements and shall document the results of the load test listed below. The independent testing lab shall meet the requirements of AASHTO R 18. Representatives of the State Materials Lab shall witness the test and sign the test report. The Contractor shall give the Engineer 30 days notice prior to testing.

Testing for Standard Duty Junction Boxes

Standard Duty Junction Boxes shall be load tested to 22,500 pounds. At each interval the test box shall be inspected for lid deformation, failure of the lid/ frame welds, vertical and horizontal displacement of the lid/ frame, cracks, and concrete spalling. The test load shall be applied uniformly through a 10 inch x 10 inch x 1 inch steel plate centered on the lid.

Concrete junction boxes will be considered to have withstood the test if none of the following conditions are exhibited:

1. Permanent deformation of the lid or any impairment to the function of the lid.
2. Vertical or horizontal displacement of the lid frame.
3. Cracks wider than 0.012 inches that extend 12 inches or more.
4. Fracture or cracks passing through the entire thickness of the concrete.
5. Spalling of the concrete.

Non concrete junction boxes will be considered to have withstood the test if none of the following conditions are exhibited:

1. Permanent deformation of the lid or lid frame or any impairment to the function of the lid.
2. Vertical or horizontal displacement of the lid frame.
3. Fracturing of the sidewall or lid.
4. Displacement of lid or junction box side.

Testing for Heavy Duty Junction Boxes

Heavy duty junction boxes shall be load tested to 46,000 pounds and then to 60,000 pounds. The test load shall be applied in both longitudinal and transverse orientations. At each interval the test box shall be inspected for lid deformation, failure of the lid/ frame welds, vertical and horizontal displacement of the lid frame, cracks, and concrete spalling. The test load shall be applied uniformly through a 10-inch x 20-inch x 1-inch steel plate centered on the lid.

Heavy duty junction boxes will be considered to have withstood the 46,000 pounds test if none of the following conditions are exhibited:

1. Permanent deformation of the lid or any impairment to the function of the lid.
2. Vertical or horizontal displacement of the lid frame.
3. Cracks wider than 0.012-inches that extend 12-inches or more.

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4. Fracture or cracks passing through the entire thickness of the concrete.
 5. Spalling of the concrete.
- Heavy duty junction boxes will be considered to have withstood the 60,000 pounds test if none of the following conditions are exhibited:
1. The lid is operational.
 2. The lid is securely fastened.
 3. The welds have not failed.
 4. Permanent dishing or deformation of the lid is 1/4 inch or less.
 5. No buckling or collapse of the box.

9-29.6(2) Slip Base Hardware

The last sentence in the first paragraph is revised to read:

Plate washers shall conform to ASTM A 36, and also shall conform to the flatness tolerances specified in AASHTO M 293 for circular washers.